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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/615,259

07/09/2003

Bruno Ghyselen

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08/25/2004

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EXAMINER

LE, THAO P

ART UNIT

PAPER NUMBER

2818

DATE MAILED: 08/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/615,259	Applicant(s) GHYSELEN ET AL.	
	Examiner Thao P. Le	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 7/9/03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>3 pages</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Acknowledge is made of applicants' claim for foreign priority base on an application 0208602 filed in France on 7/9/02.

Election/Restriction

2. Examiner confirms that Applicants elected to prosecute Claims 1-35 and have withdrawn Claims 36-44 without prejudice.

Information Disclosure Statement

3. Information Disclosure Statements (IDSs) filed on 7/9/03, 5/8/04, 7/22/04 and made of record. The references cited on the PTOL 1449 forms have been considered.

Claim Rejections

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 30-31 are rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicant(s) regard as their invention. Claim 30 is unclear and confuse by stating that "providing a repeating pattern of first and second

layers”, what is this pattern? What does it do? What is repeating pattern? How does this pattern be repeated on the first and second layers? In Claims 30 and 31, “the first layers” and “in the second layers”, it is not clear whether “the first layers” is a single layer or multiple layers and “the second layers” is a single layer or multiple layers?

Claims 32-34 are dependent from the above rejected claim and therefore considered indefinite.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 30-31 are rejected under 35 USC 102 (e) as being anticipated by Cheng et al., U.S. Patent No. 6573126.**

Regarding to claim 30, Cheng discloses a method of preparing a wafer comprising providing a first and second layers, and performing multiple transfers of portion of layers to receiving substrates to produce product wafers, each portion including at least one of the first layers (Figs 1B, 5-8).

Regarding claim 31, Cheng further discloses creating regions of weakness in the second layers to facilitate splitting (See Figs. 1B, 5-8).

8. Kub et al., U.S. Patent No. 6323108 and other references cited in PTO-890 and PTO 1449 forms also disclose the limitations disclosed in claim 30.

9. **Claims 32-34 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Cheng et al., U.S. Patent No. 6,573,126.**

Regarding to claims 32-34, Cheng et al. discloses the method of claim 30 and also disclose the steps of providing a matching layer, growing on the matching layer a

strained layer and a strained retaining layer, and creating a region of weakness in the strained layer and splitting the composite structure at the strain-retaining layer (Fig. 1B).

Cheng fails to disclose the step of creating a second weakness in the first strained-retaining layer which transferred in a second donor substrate and then splitting the second composite structure a second time at the second weakness region. However, the splitting of one step into two, where the processes are substantially identical of equivalent in terms of function, manner and result, was held to not patentably distinguish the processes. Ex party Rubin 128 USPQ 440 (PTO BdPatApp 1959).

10. Claims 1, 35 are rejected under 35 USC 102 (e) as being anticipated by Kub et al., U.S. patent No. 6323108.

Regarding claims 1, 35, Kub et al. discloses a method for preparing a substrate comprising:

- creating a region of weakness (implanting hydrogen, Introduction, Figs. A-B) in a matching substrate that comprising a matching layer (Si substrate) with a first lattice parameter on a first surface, wherein the region of weakness is configured to splitting;

- growing on the first surface of the matching layer a first strained layer (Si) in a strained state and it is inherently that the strained Si layer imparts the same first lattice parameter in the first strained layer as in the matching layer (made of similar material)

. associating a receiving substrate (handle substrate) with the first strained layer to form a composite structure (Fig. B) and

. obtaining a product wafer and a donor wafer by splitting the composite structure at the region of weakness, wherein the product wafer includes the strained first layer and the receiving substrate (fig. C), while the donor wafer includes at least a portion of the matching layer (part of Si substrate).

11. Claims 2-29 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Kub et al., U.S. patent No. 6323108, in view of Cheng et al., U.S. Patent No. 6,573,126.

Regarding to claims 2-3, Kub fails to disclose the matching layer formed on a handling substrate and the matching layer includes a buffer layer and a relaxed surface layer on which the first strained layer is grown. Cheng et al. discloses a buffer Ge layer formed on a donor substrate and the matching layer is a relaxed GaAs layer formed on buffer layer (abstract, second embodiment). The relaxed GaAs layer is splitting at the area where hydrogen ions are introduced. It is well known in the art that the matching layer can be both a donor substrate and a matching layer or it can be formed on a donor substrate. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a buffer layer and a relaxed surface layer on which the first strained layer is grown because the buffer and relaxed surface layer are formed under the strained layer would allow high quality materials with limited dislocation

defects to be produced and transferred and simplified and improved process (summary of the invention, Col. 2).

Regarding claim 4, Cheng discloses the buffer layer is graded (lines 48-50, Col. 2).

Regarding claim 5, both Kub and Cheng disclose the region of weakness is created by implanting atomic species (abstract).

Regarding to claim 6, both Kub and Cheng fail to disclose the region of weakness is created by adding a porous layer, however, this technique is well known in the art of splitting substrate or transferring layer to different substrate.

Regarding claim 7, it is inherent that the lattice parameter of the first material when strained is different than the lattice parameter of the first material in a relaxed state.

Regarding to claims 8-13, Kub and Cheng discloses limitations disclosed in claims 8-13; the receiving substrate is bonded to the strained layer, the roughness of the retained portion of matching layer is smooth out after splitting (Fig. 1D of Kub).

Regarding to claim 14, the matching layer in Kub is also viewed as the substrate layer, and the strained layer comprises silicon. Kub fails to disclose the matching layer comprises SiGe. Cheng discloses the matching layer is made of SiGe. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use SiGe as a matching layer because SiGe material would allow high quality materials with limited dislocation defects to be produced and transferred and simplified and improved process (summary of the invention, Col. 2).

Regarding claim 15, it is obvious to form the weakness region after growing the first strained layer to avoid the wafer split during formation of strained layer.

Regarding claims 16-29, Kub and Chang disclose the limitations as applied in claims 16-29 (See Figs. 1A-1C of Cheng and Fig. 1 of Kub et al.).

12. When responding to the office action, Applicants' are advice to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao P. Le whose telephone number is 571-272-1785. The examiner can normally be reached on M-T (7-6).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2818

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Thao P. Le'.

Thao P. Le
Examiner
Art Unit 2818